

Assessment of Cognitive Function in Type 2 Diabetes

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ABSTRACT

If health care is ultimately to reduce morbidity and mortality, all forms of cognitive dysfunction must be decreased, whether mild cognitive impairment, dementia, or Alzheimer's; to do this, health care providers must consider evaluations of cognitive function in people with type 2 diabetes (T2DM), as the condition is associated with a higher risk for cognitive dysfunction. This report addresses cognitive assessment in T2DM and invites advanced practice nurses to review the current data on assessing and making recommendations to individuals with T2DM.

Keywords: cognitive dysfunction, screening, type 2 diabetes

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INTRODUCTION

The complications of type 2 diabetes (T2DM) discussed most often with patients include cardiovascular disease, neuropathy, and retinopathy. Cognitive dysfunction, however, is also closely associated with T2DM, and evidence suggests that it should be addressed by health care providers. In a meta-analysis of 14 studies that together examined 100,000 cases of dementia, T2DM was found to be associated with a 60% risk for dementia.¹ In addition, having T2DM in midlife is associated with a 19% greater decline in cognitive function over 20 years than for those without T2DM.² Indeed, the incidence of dementia and cognitive decline may begin early in T2DM's development. Some studies have found changes in brain structure and brain activation patterns with obesity, insulin resistance, and/or metabolic syndrome before development of overt T2DM.³ This is unfortunate, as many individuals with T2DM are unable to adhere to self-management recommendations such as home glucose monitoring or specific diet and exercise regimens, thus contributing to cognitive dysfunction that leads to poorer glycemic control.⁴ Moreover, lack of glycemic control is linked to the development and progression of cognitive dysfunction.⁵

In primary care, we therefore have a major opportunity to advocate for cognitive screening in patients with T2DM who are at risk for cognitive dysfunction and to implement simple assessments of

cognitive function during an annual exam as well as make necessary referrals. All forms of cognitive dysfunction must be decreased, whether mild cognitive impairment, dementia, or Alzheimer's, if morbidity and mortality are to be reduced. Thus, health care providers must consider evaluations of cognitive function in people with T2DM, along with insulin resistance, obesity, and metabolic syndrome. Once cognitive dysfunction is detected and diagnosed, health care providers can implement guideline-based T2DM care that addresses the potential impact of patients' cognitive impairment on their self-care.⁶ Therefore, advanced practice nurses need to be familiar with the guidelines and simple screening tools for treatment of cognitive deficits.

SCREENING GUIDELINES

The Affordable Care Act stipulates that clinicians must assess individuals aged ≥ 65 for cognitive impairment as part of their annual wellness visit (www.healthcare.gov/law/full/index.html). The United States Preventive Services Task Force recommends that clinicians use the Dementia Screening Indicator to help identify those who may benefit from cognitive impairment screening. Potential predictive factors on the screening form include depressive symptoms, body mass index < 18.5 , functional difficulties, and T2DM.⁷ Recent guidelines from the American Geriatrics Society (AGS) and the American Diabetes Association also

recommend assessment of cognitive function as a standard of care in older adults with T2DM.^{8,9} The AGS states that clinicians should assess all older adults with T2DM in an initial visit for cognitive impairment. Any increased difficulty in self-care (eg, missed appointments, multiple medication errors, or inability to perform skills they were proficient at in the past, such as self-glucose monitoring) should be considered as a change that requires additional assessment. Screening for other factors that can affect cognitive function, such as B₁₂ deficiency, depression, and hypothyroidism, are also part of the AGS guidelines. However, assessment for cognitive impairment in T2DM may not be fully implemented in the outpatient setting and recommendations have not been made at all for screening patients age < 65, despite the risks associated with a longer duration of T2DM.⁸⁻¹⁰

ASSESSMENT TOOLS

Asking patients about changes in cognitive function is important, but, beyond that, structured assessments are necessary.¹¹ For general assessment of cognitive function in T2DM, several quick and sensitive assessments have been utilized in outpatient settings. Table 1 provides brief descriptions of 3 such tools. The Montreal Cognitive Assessment (MoCA) is recommended by both the American Diabetes Association and the AGS.^{8,9} The MoCA, a pen/paper test specifically developed by a neurologist for use in clinics with a high volume of patients, is precise in measuring cognitive impairment, sensitive to early stages of neurodegenerative conditions, and easy to administer (it takes approximately 10 minutes).¹⁶ This instrument assesses memory, visuospatial ability, executive function, attention, language, and orientation. In a review of tools used to assess cognitive function in primary care, the MoCA, in combination with the Digit Symbol Substitution Test, was found to be more sensitive in detecting mild cognitive deficits in those with T2DM than the commonly used Mini-Mental Status Examination (MMSE).^{16,17} The MMSE does not measure executive function, a domain that shows deficits in T2DM.¹³ Some clinicians have argued that the clock drawing test alone is sufficient for detecting cognitive problems, but comparative studies have yet to confirm this

Table 1. Cognitive Screening Tool Characteristics

Test	Advantages ¹⁰	Disadvantages ¹⁰	Time to Administer	Specificity and Sensitivity	Reliability
Montreal Cognitive Assessment (MoCA)	<ul style="list-style-type: none"> • Versions for multiple languages and visual impairment • Assesses many separate cognitive domains • Sensitive to early cognitive impairment 	<ul style="list-style-type: none"> • Administration time >10 minutes • Education bias (< 12 years) • Requires training before administration 	10-15 minutes ¹²	93/67 ¹³	alpha = 0.91 ¹⁶
Mini-Cog	<ul style="list-style-type: none"> • Versions for multiple languages • No education bias • Administration time is relatively short 	<ul style="list-style-type: none"> • Word lists will vary and may affect scores 	3-5 minutes ¹⁴	87/90 ¹³	Cohen's kappa = 0.949 ¹⁴
Mini-Mental Status Examination (MMSE)	<ul style="list-style-type: none"> • Widely used and studied • Reference point for comparison with other cognitive tests • Required for some insurance reimbursements 	<ul style="list-style-type: none"> • Controlled by copyright • Language bias • Highly educated impaired subject pass (ceiling effect) 	7-10 minutes ¹⁵	93/13 ¹⁵	alpha = 0.877 ¹⁵

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